CHEMISTRY NMDCAT

(UNIT–6)

TOPIC

- ✓ **CHEMICAL KINETICS**
- ✓ **THERMOCHEMISTRY AND ENERGETICS OF CHEMICAL REACTIONS**

Q.1 In a reaction, A + B → Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants A and B. are doubled, rate law for the reaction can be written as

a. Rate = k [A][B]
b. Rate = k $[A]^2[B]$
c. Rate = k $[A]^3[B]$
d. Rate = k $[A][B]^2$

Q.2 When the change in concentration is 6×10^{-5} $moldm^{-3}$ and time for that change is 100 seconds, the rate of reaction will be

a. 6×10^{-3} $moldm^{-3}$ sec^{-1}
b. 6×10^{-7} $moldm^{-3}sec^{-1}$
c. 6×10^{-4} $moldm^{-3}$ sec^{-1}
d. 6×10^{-5} $moldm^{-3}sec^{-1}$

Q.3 For reaction A+2B →C, If concentration of A and B is doubled, then rate of reaction will increase

a. 4 times
b. 8 times
c. 6 times
d. 16 times

Q.4 Rate of following reaction can be expressed as $PCl_5 \longrightarrow PCl_3 + Cl_2$

a. $\text{Rate} = -\frac{d[PCl_5]}{dt}$
b. $\text{Rate} = -\frac{d[PCl_3]}{dt}$
c. $\text{Rate} = +\frac{d[PCl_5]}{dt}$
d. $\text{Rate} = -\frac{d[Cl_2]}{dt}$

Q.5 Half-life of a reaction $A \longrightarrow B$ is $\left(\frac{0.693}{2}\right)$ seconds its rate constant is

a. $0.231s^{-1}$
b. $2s^{-1}$
c. $4s^{-1}$
d. $20s^{-1}$

Q.6 The rate law for the reaction is rate = $k[A][B]^{2/3}$. The order of reaction is

a. Zero
b. 2/3
c. 1/3
d. 5/3

Q.7 The half-life of following first order reaction A → B + C is 10min. The concentration of A would be reduced to 12.5% of original concentration in

a. 30 min
b. 40 min
c. 70 min
d. 90 min

Q.8 In the given $2A + B \longrightarrow$ products it is observed on quadrupling the conc. of B, rate is increases 16times. The order of reaction with respect to B is

a. 0
b. 1
c. –1
d. 2

Q.9 If rate constant for any reaction is equal to rate of reaction at all concentrations. Then the order of reaction will be

a. Zero
b. One
c. Two
d. Three

Q.10 The rate of chemical reaction roughly doubles for every 10^oC rise of temperature. If temperature is raised by 20°C, the rate may become

a. 4 times
b. 16 times
c. 8 times
d. 32 times

Q.11 Which of the following is type of slow reaction

a. Fermentation
b. Hydrolysis of ester
c. Rusting of iron
d. Neutralization

Q.12 In Rate = k[A][B] the second order reaction become ____ if [A] is in large excess

a. 2^{nd} order
b. 3^{rd} order
c. Zero order
d. Pseudo 1^{st} order

Q.13 When the temperature of the reacting gases is raised by 10K, the fraction of molecules with energy more than E_a roughly _____ and so the reaction rate also _____

a. Doubles, Half
b. Doubles, Doubles
c. Half, Doubles
d. Half, Half

Q.14 Rate of first order reaction depends on _____

a. Concentration of one reactant
b. Concentration of two reactants
c. Concentration of three reactants
d. Independence of the initial concentration

Q.15 For which order of reaction rate constant has same units as rate of reaction

a. First order reaction
b. Third order reaction
c. Second order reaction
d. Zero order reaction

Q.16 Half-life of radioactive isotope is 10days. Days required when 12.5% concentration is left behind

a. 10
b. 30
c. 20
d. 40

Q.17 Activity of iron catalyst in Haber process is increased by all except

a. CO
b. Cr_2O_3
c. Al_2O_3
d. MgO

Q.18 Arrhenius equation describes the effect of

a. Temperature on rate of reaction
b. Volume on rate of reaction
c. Pressure on rate of reaction
d. Number of moles on rate of reaction

Q.19 Following first order reaction is 50 percent completed in 24 minutes at 300K

$2N_2O_5 \rightarrow 4NO_2 + O_2$ $[N_2O_5]$ given = 10g

How many grams of N_2O_5 will be left behind after 72 minutes?

a. 1.77g
b. 1.25g
c. 2.5g
d. 0.630g

Q.20 $3Fe + 4H_2O \xrightarrow{Pt} Fe_3O_4 + 4H_2$ is example of _____

a. Homogeneous catalysis
b. Heterogeneous catalysis
c. Auto catalysis
d. Negative catalysis

Q.21 The rate expression of a reaction is, Rate = $k[A][B]^2$

What happens to rate of reaction if concentrations of A and B are doubled?

a. Increased two times
b. Increased four times
c. Increased eight times
d. Increased nine times

Q.22 If E_f and E_b are the activation energies for forward and backward reaction respectively. How these can be compared for the exothermic reaction.

a. $E_f > E_b$
b. $E_f < E_b$
c. $E_f = E_b$
d. No prediction can be made

Q.23 For endothermic reaction, Ea is activation energy in kJ/mol. The maximum value of enthalpy of reaction (ΔH) will be

a. Less than Ea
b. More than Ea
c. Equal to Ea
d. Zero

Q.24 The units of second order rate constant are usually expressed as

a. $mole^{-1}\ dm^{-3}\ s^{-1}$
b. $mol^{-1}\ dm^{3}\ s^{-1}$
c. $mole\ dm^{3}\ .\ s^{-1}$
d. $mol\ dm^{-3}\ s^{-1}$

Q.25 At zero activation energy (E_a) value of Arrhenius constant A is

a. K
b. K/2
c. 2K
d. Zero

Q.26 The heats of neutralization of four acids A, B, C and D are –57.26, –39.32, –46.86, and –51.88 kJ/mol respectively, when they are neutralized by same base, the acidic character follows the order

a. A > B > C > D
b. A > D > C > B
c. D > C > B > A
d. D > B > C > A

Q.27 Standard enthalpy of combustion of carbon (ΔH_c°) is

a. –393.7 kJ/mol
b. +393.7 kJ/mol
c. –57.4 kJ/mol
d. +787 kJ/mol

Q.28 Correct decreasing order of energy is

a. 1 erg > 1 Joule > 1 Cal
b. 1 Cal > 1 Joule > 1 erg
c. 1 erg > 1 Cal > 1 Joule
d. 1 Joule > 1 Cal > 1 erg

Q.29 Lesser the energy of a system

a. Greater is its stability
b. Lesser is its stability
c. Greater is its un-stability
d. None of these

Q.30 For the melting of ice ΔH is

a. Negative
b. Positive
c. Zero
d. Cannot be predicted

Q.31 When an exothermic reaction is reversed it

a. Becomes another exothermic reaction
b. Becomes an endothermic reaction
c. Show no heat change at all
d. Attains equilibrium

Q.32 ΔH for the reaction, $H_{(g)} + H_{(g)} \rightarrow H_{2(g)}$ will be

a. Zero
b. Positive
c. Negative
d. Zero or positive

Q.33 The ΔH for the reaction, $CH_3COOH \longrightarrow CH_3COO^- + H^+$

a. Negative
b. Positive
c. Zero
d. Unpredictable

Q.34 For a given reaction

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

The change in enthalpy under standard conditions is called?

a. Standard enthalpy change of solution
b. Standard enthalpy change of neutralization
c. Standard enthalpy change of hydration
d. Standard enthalpy change of formation

Q.35 Electron affinity of chlorine is

a. $Cl_{(g)} \longrightarrow Cl^{+1}_{(g)} + 1e^- \quad \Delta H = +349\,kJ/mole$

b. $Cl_{(g)} + 1e^- \longrightarrow Cl^{-1}_{(g)} \quad \Delta H = -349\,kJ/mole$

c. $Cl^{-1}_{(g)} + 1e^- \longrightarrow Cl^{+2}_{(g)} \quad \Delta H = -250kJ/mole$

d. $Cl^{-1}_{(g)} \longrightarrow Cl^{\circ}_{(g)} + 1e^- \quad \Delta H = -200kJ/mole$

Q.36 Gaseous phosphorus pentachloride can be decomposed into gaseous phosphorus tri chloride and chlorine by heating. The bond energies of P-Cl and Cl-Cl bonds are 330 and 240 kJ mol^{-1}. The enthalpy change for the decomposition of PCl_5 to PCl_3 and Cl_2:

a. –420 $kJmol^{-1}$
b. –90 $kJmol^{-1}$
c. +90 $kJmol^{-1}$
d. +420 kJ mol^{-1}

Q.37 Which value of heat of formation indicates that the product is the least stable

a. – 94 kCals
b. – 231.6 kCals
c. + 21.4 kCals
d. + 64.8 kCals

Q.38 Absorption of heat occurs when

a. Carbon burns in air
b. NH4Cl dissolved in water
c. SO_2 is oxidized to SO_3
d. CH_4 gas is burnt

Q.39 Identify the state function among the following

a. q
b. q / W
c. q x W
d. q + W

Q.40 $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)} \quad \Delta H = W$

$CO_{(g)} + \frac{1}{2}O_{2(g)} \longrightarrow CO_{2(g)} \quad \Delta H = Y$

The heat of formation of carbon monoxide may be

a. W + Y
b. Y – W
c. W – Y
d. W × Y

Q.41 For the neutralization of 1 mole of H_2SO_4 with 2 moles of NaOH in dilute solution, the heat liberated is

a. =57 kJ
b. < 57 kJ
c. > 57kJ
d. =28.5 kJ

Q.42 Lattice energy of NaCl

a. $Na_{(s)} + Cl_{2(g)} \longrightarrow NaCl_{(g)} \quad \Delta H = +7871 kJ/mole$

b. $Na_{(s)} + Cl^{-1}_{(g)} \longrightarrow NaCl_{(s)} \quad \Delta H = -787 kJ/mole$

c. $Na^{+1}_{(g)} + Cl^{-1}_{(g)} \longrightarrow NaCl_{(s)} \quad \Delta H = -787 kJ/mole$

d. $Na^{+1}_{(g)} + Cl^{-1}_{(g)} \longrightarrow NaCl_{(s)} \quad \Delta H = +787 kJ/mole$

Q.43 The enthalpy change of a reaction does not depend on

a. Initial and final enthalpy change of reaction
b. Different intermediate reactions
c. State of reactants and products
d. Nature of reactant and product

Q.44 Which enthalpy change (ΔH) is relevant in the following process.

$$H_2 \longrightarrow H + H \quad \Delta H = +436 kJmol^{-1}$$

a. Enthalpy of formation
b. Enthalpy of solution
c. Bond dissociation energy
d. Enthalpy of combustion

Q.45 Heat of formation of MgO is given below:

$$Mg_{(s)} + \frac{1}{2} O_{2(g)} \rightarrow MgO_{(s)} \qquad \Delta H_f^o = -692 KJ/mol$$

This equation shows that

a. The reaction is endothermic
b. The product is very stable
c. The product is highly unstable
d. The reactants are very stable

Q.46 In exothermic reaction heat transfer form

a. Surrounding to system
b. System to surrounding
c. System to system
d. Surrounding to surrounding

Q.47 The average amount of energy which is required to break one mole of similar bonds in a substance is called

a. Bond energy
b. Activation energy
c. Internal energy
d. Kinetic energy

Q.48 Enthalpy change during the formation of one mole of atoms from its elements is called enthalpy of atomization. The element in this change is in

a. Solid state
b. Liquid state
c. Gaseous state
d. Any of the above state

Q.49 Which of the following formula cannot be used in Hess's law

a. $\Delta H = \Delta H_1 + \Delta H_2$
b. $\Delta H_f^\circ = \Delta H_l^\circ + \Delta H_x$
c. $\sum \Delta H_{(cycle)} = 0$
d. $\Delta H_l^\circ = \Delta H_f^\circ + \Delta H_x$

Q.50 $A_2 + B_2 \rightarrow 2AB \qquad \Delta H = ?$

In above reaction if 500 kJ energy is absorbed to break bonds in reactants and 750kJ energy is evolved during new bonds formation in products than ΔH of the reaction is

a. +250 kJ
b. +125 kJ
c. −250 kJ
d. −125 kJ

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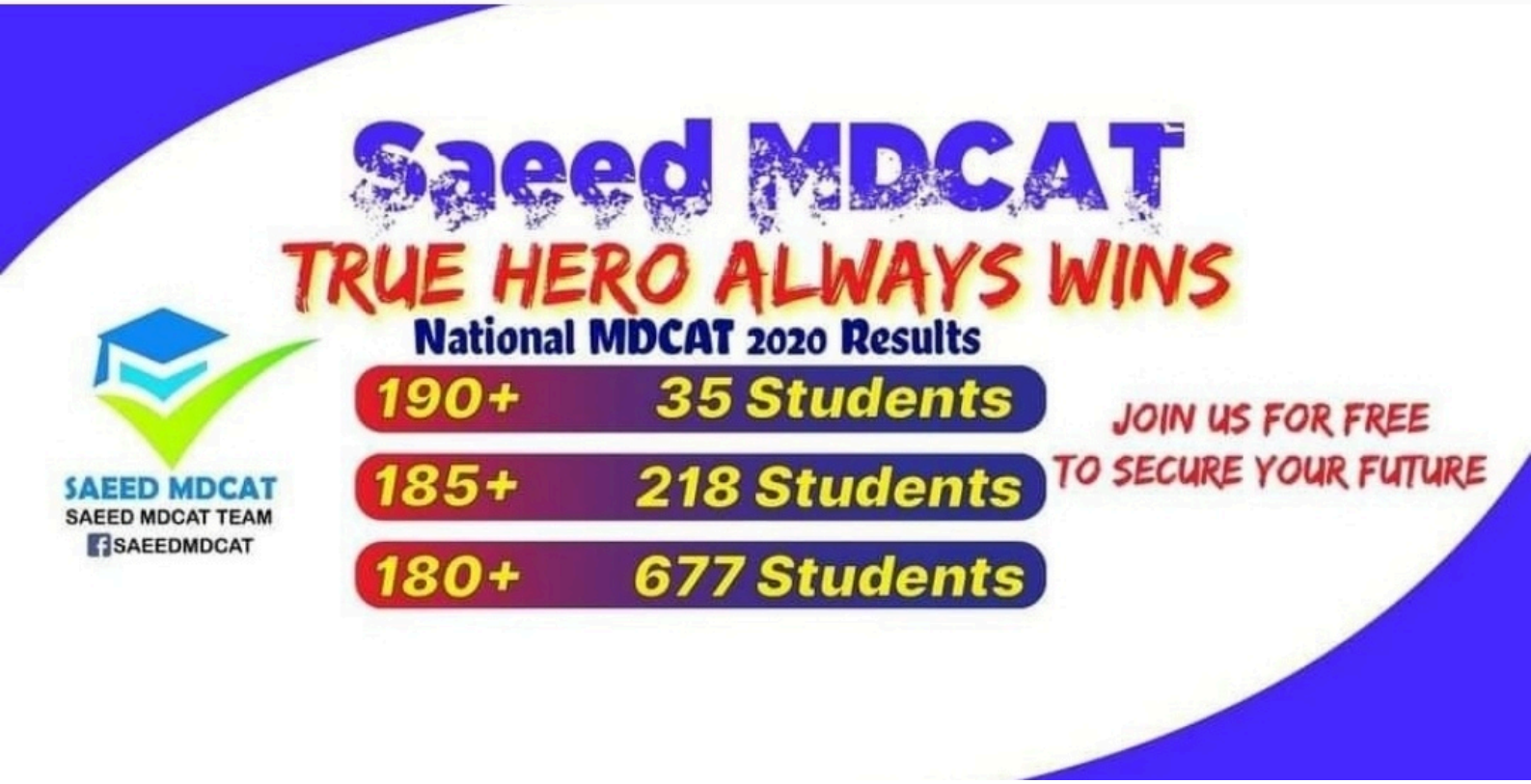
	A	B	C	D		A	B	C	D		A	B	C	D		A	B	C	D
1	○	●	○	⊙	16	○	●	○	○	31	○	●	○	○	46	○	●	○	○
2	○	●	○	○	17	●	○	○	○	32	○	○	●	○	47	●	○	○	○
3	○	●	○	○	18	●	○	○	○	33	○	●	○	○	48	○	○	○	●
4	●	○	○	○	19	○	●	○	○	34	○	●	○	○	49	○	○	○	●
5	○	●	○	○	20	○	●	○	○	35	○	●	○	○	50	○	○	●	○
6	○	○	○	●	21	○	○	●	○	36	○	○	○	●	51	○	○	○	○
7	●	○	○	○	22	○	●	○	○	37	○	○	○	●	52	○	○	○	○
8	○	○	○	●	23	●	○	○	○	38	○	●	○	○	53	○	○	○	○
9	●	⊙	○	○	24	○	●	○	○	39	○	○	○	●	54	○	○	○	○
10	●	○	○	○	25	○	○	○	○	40	○	○	●	○	55	○	○	○	○
11	⊙	○	●	○	26	○	●	○	○	41	○	○	●	○	56	○	○	○	○
12	○	○	○	●	27	●	○	○	○	42	○	○	●	○	57	○	○	○	○
13	○	●	⊙	○	28	○	●	○	○	43	○	●	○	○	58	○	○	○	○
14	●	○	○	○	29	●	○	○	○	44	○	○	●	○	59	○	○	○	○
15	○	○	○	●	30	○	●	○	○	45	○	●	○	○	60	○	○	○	○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